data for indicating grid positions of the multi-dimensional look-up table;

data for generating a weight table to store weight values corresponding to the plural components based on the set grid positions, wherein the weight values are calculated by an integer computation, and the weight table is used for obtaining the weight values corresponding to the plural components of input image data; and

data representing a computation for calculating the processed image data corresponding to the input image data by interpolation using output data of grid points of the multi-dimensional look-up table corresponding to the input image data, and the obtained weight values, wherein the interpolation is executed by a floating point computation; and

data for normalizing the process of calculating and obtaining the weight values and the interpolation by a sufficiently large value.

REMARKS

Claims 1, 3 to 6, 11 and 12 are pending in the application, with Claims 1, 6, 11 and 12, the independent claims, having been amended herein. Reconsideration and further examination are respectfully requested.

Claims 1, 3 to 6, 11 and 12 were objected to for allegedly containing a term that was not expressly recited in the specification. Without conceding the propriety of this objection, Applicant submits that the claim amendments set forth herein, to more clearly define the invention, are believed to render moot this objection. Support for the claim amendments is provided at Figure 9, and at pages 15 to 17 and 19 of the specification. In particular, generation of a weight table is supported by steps 2 to 4 of Figure 9, and by

Equation 9 on page 15 of the specification. In addition, obtaining weight values is supported by step 6 of Figure 9, the interpolation is supported by step 8 of Figure 9, and the normalization is supported by Equations 9 and 10 on pages 15 to 17 of the specification. Accordingly, reconsideration and withdrawal of the objection to Claims 1, 3 to 6, 11 and 12 are respectfully requested.

Claims 1, 3 to 6, 11 and 12 were rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 5,883,821 (Komaki) in view of U.S. Patent No. 5,390,035 (Kasson). Reconsideration and withdrawal of this rejection are respectfully requested.

Turning to specific claim language, amended independent Claim 1 is directed to a data conversion method of performing image processing on image data expressed in plural components by using a multi-dimensional look-up table, and outputting processed image data. The method includes setting grid positions of the multi-dimensional look-up table, generating a weight table to store weight values corresponding to the plural components based on the set grid positions, wherein the weight values are calculated by an integer computation, obtaining the weight values corresponding to the plural components of input image data by referring to the weight table, obtaining output data of grid points of the multi-dimensional look-up table which corresponds to the input image data, calculating the processed image data, which corresponds to the input image data, by interpolation using the obtained output data and the obtained weight values, wherein the interpolation is executed by a floating point computation, and normalizing the process of calculating and obtaining the weight values and the interpolation by a sufficiently large value.

The applied art, namely Komaki and Kasson, is not seen to disclose or suggest the foregoing features of amended independent Claim1, particularly with respect to

generating a weight table to store weight values corresponding to the plural components based on the set grid positions, wherein the weight values are calculated by an integer computation, obtaining the weight values corresponding to the plural components of input image data by referring to the weight table, obtaining output data of grid points of the multi-dimensional look-up table which corresponds to the input image data, calculating the processed image data, which corresponds to the input image data, by interpolation using the obtained output data and the obtained weight values, wherein the interpolation is executed by a floating point computation, and normalizing the process of calculating and obtaining the weight values and the interpolation by a sufficiently large value.

According to the aforementioned features, the weight values are calculated by an integer computation as shown in Equations 9, the interpolation is executed by a floating point computation as shown in Equations 10, the weight table is generated prior to image data to be inputted, and the weight values are normalized by a sufficiently large value (indicated by "L" in Equations 9 and 10) to process the weight value as an integer. According to this combination of features of the present invention, the interpolation processing is quickly and precisely performed in an efficient manner.

Komaki is generally seen to be directed to interpolation processing which uses a arithmetic expression that corresponds to a position of input data in a divided segment of an interpolation space. (Komaki, abstract; Figures 3 and 38; and column 3, lines 13 to 22). Komaki is seen to divide an interpolation space into a plurality of segments, and then to use an arithmetic expression during interpolation processing to determine a position of a particular one of the divided segments that corresponds to input data. (Komaki, Figures 38; column 13, lines 17 to 67; and column 14, lines 1 to 35).

However, Komaki is not seen in any way to disclose or suggest generating a weight table to store weight values corresponding to the plural components based on the set grid positions, wherein the weight values are calculated by an integer computation, obtaining the weight values corresponding to the plural components of input image data by referring to the weight table, obtaining output data of grid points of the multi-dimensional look-up table which corresponds to the input image data, calculating the processed image data, which corresponds to the input image data, by interpolation using the obtained output data and the obtained weight values, wherein the interpolation is executed by a floating point computation, and normalizing the process of calculating and obtaining the weight values and the interpolation by a sufficiently large value.

In this regard, Kasson is not seen to remedy the foregoing deficiencies of Komaki. In particular, Kasson is seen to be directed to color conversion using a multi-variable function by dividing the input domain into polyhedra segments. (Kasson, abstract; Figures 5 and 14; column 7, lines 5 to 68; column 8, lines 1 to 68; and column 9, lines 1 to 45). Although the term "normalization" is mentioned in Figure 16 of Kasson, Applicant submits that this has nothing to do with the *normalization* of the process of calculating and obtaining the weight values and the interpolation by a sufficiently large value, as in amended independent Claim 1. The mention of normalization in Figure 16 of Kasson concerns the display of normalized interpolation errors *resulting* from three different interpolation methods, including the interpolation method disclosed in Kasson and two prior-art methods. (Kasson, Figure 16; column 22, lines 46 to 52). These interpolation errors were normalized for comparison purposes in Figure 16 of Kasson. Nowhere is Kasson actually seen to utilize a normalization process *during the calculating and*

obtaining of the weight values and during the interpolation process, as in amended independent Claim 1, so as to reduce interpolation error. In contrast to the present invention, the interpolation method of Kasson, which is not seen to use a normalization step, results in an interpolation error as shown in the normalized interpolation errors of Figure 16. The remaining art of record has been reviewed and is not seen to remedy the foregoing deficiencies of Komaki and Kasson with respect to amended independent Claim 1.

Accordingly, Applicant submits that the applied references, whether alone or in combination, for which no motivation or suggestion is seen, is not seen to disclose or suggest the elements of amended independent Claim 1. Applicant therefore submits that a *prima facie* case of obviousness has not been established with respect to amended independent Claim 1. M.P.E.P. § 2143.

Based on the foregoing, amended independent Claim 1 is believed to be in condition for allowance and such action is respectfully requested. In addition, amended independent Claim 6 is directed to a data conversion apparatus, amended independent Claim 11 is directed to a computer program product storing computer program codes, and amended independent Claim 12 is directed to a computer readable medium with recorded data, all of which include substantially similar features as those of amended independent Claim 1. Accordingly, amended independent Claims 6, 11 and 12 are also believed to be in condition for allowance for the reasons discussed above with respect to amended independent Claim 1.

The other pending claims in this application are each dependent from the independent claims discussed above and are therefore believed patentable for the same

rcasons. Because each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, the entire application is believed to be in condition for allowance, and such action is respectfully requested at the Examiner's earliest convenience.

Applicant's undersigned attorney may be reached in our Costa Mesa, CA office at (714) 540-8700. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE TO CLAIMS

1. (Twice Amended) A data conversion method of performing image processing on image data expressed in plural components by using a multi-dimensional look-up table, and outputting processed image data, comprising the steps of:

setting grid positions of the multi-dimensional look-up table;

generating a weight table to store weight values corresponding to the plural components based on the set grid positions, wherein the weight values are calculated by an integer computation;

obtaining the weight values corresponding to the plural components of [a value which represents distance from] input image data by referring to [a grid point of] the weight [multi-dimensional look-up] table[, and which is normalized by a sufficiently large value];

obtaining output data of grid points of the multi-dimensional look-up table which corresponds to the input image data; [and]

calculating the processed image data, which corresponds to the input image data, by interpolation using the obtained output data and the obtained weight values [value], wherein the interpolation is executed by a floating point computation [an integral operation]; and

normalizing the process of calculating and obtaining the weight values and the interpolation by a sufficiently large value.

6. (Twice Amended) A data conversion apparatus for performing image processing on image data expressed in plural components by using a multi-dimensional look-up table, and outputting processed image data, comprising:

a setting section, arranged to set grid positions of the multi-dimensional look-up table;

a generator, arranged to generate a weight table to store weight values corresponding to the plural components based on the set grid positions, wherein the weight values are calculated by an integer computation;

a first obtaining section, arranged to obtain the weight values corresponding to the plural components of [a value which represents distance from a grid point of the multi-dimensional look-up table to] input image data by referring to the weight table[, and which is normalized by a sufficiently large value];

a second obtaining section, arranged to obtain output data of grid points of the multi-dimensional look-up table which corresponds to the input image data; [and]

a computation section, arranged to calculate the processed image data, which corresponds to input image data, by interpolation using the obtained output data and the obtained

weight values [value], wherein the interpolation is executed by a floating point computation [an integral operation]; and

a normalizing section, arranged to normalize the process of calculating and obtaining the weight values and the interpolation by a sufficiently large value.

11. (Twice Amended) A computer program product storing a computer readable medium having a computer program code, for a data conversion method of performing image processing on image data expressed in plural components by using a multi-dimensional look-up table, and outputting processed image data, the product comprising process procedure codes for:

setting grid positions of the multi-dimensional look-up table;

generating a weight table to store weight values corresponding to the plural components based on the set grid positions, wherein the weight values are calculated by an integer computation;

obtaining the weight values corresponding to the plural components of [a value which represents distance from] input image data [to a grid point of] by referring to the weight [multi-dimensional look-up] table[, and which is normalized by a sufficiently large value];

obtaining output data of grid points of the multi-dimensional look-up table which corresponds to the input image data; [and]

calculating the processed image data, which corresponds to the input image data, by interpolation using the obtained output data and the obtained weight values [value], wherein the interpolation is executed by a floating point computation [an integral operation]; and

normalizing the process of calculating and obtaining the weight values and the interpolation by a sufficiently large value.

12. (Twice Amended) A computer readable medium storing recorded data which is used in data conversion processing to process image data expressed in plural components by using a multi-dimensional look-up table, and to output processed image data, the recorded data comprising:

data for indicating grid positions of the multi-dimensional look-up table;

data for generating a weight table to store weight values corresponding to the plural components based on the set grid positions, wherein the weight values are calculated by an integer computation, and the weight table [data] is used for obtaining the weight values corresponding to the plural components of [a value which represents distance from a grid point of the multi-dimensional look-up table to] input image data[, and which is normalized by a sufficiently large value]; and

data representing a computation for calculating the processed image data corresponding to the input image data by interpolation using output data of grid points of the multi-dimensional look-up table corresponding to the input image data, and the obtained weight

values [value], whercin the interpolation is executed by a floating point computation [an integral operation]; and

data for normalizing the process of calculating and obtaining the weight values and the interpolation by a sufficiently large value.

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